

REMARKS

I. INTRODUCTION

This application stands with claims 1-21, 25-28, 31-37, and 50-54 where claims 1, 8, 13, 26, and 32 are independent claims. Applicants thank the Examiner for indication that claims 1-21, 25-28, 31-37, and 50-54 are allowable over the prior art of record. Applicants amend claims 1, 8, 13, 26, and 32 as recited above to overcome the Examiner's subject matter rejections as explained below.

II. SUBJECT MATTER REJECTION UNDER 35 USC §101

Claims 1-21, 25-28, 31-37, and 50-54 stand rejected under 35 U.S.C. §101 as directed to non-statutory subject matter. In response, Applicants traverse and amended claims 1, 8, 13, 26, and 32 to more clearly direct the claims to statutory subject matter to expedite prosecution.

The Examiner's comments 6.1.1 through 6.1.7 appear directed to two general categories of subject matter rejection, as discussed in turn below.

A. Tie to Underlying Class

Claims 1 and 13 are now more clearly tied to a "computer," which is an apparatus, and thus qualifies as statutory subject matter. Support for this amendment appears throughout the specification (*see, e.g.*, page 5, lines 9-11). Also, claim limitations now require that steps be completed automatically, such that a computer or a computing device performs the steps rather than computations that can be done in the mind (supported in the specification at page 4, line 22-24). Claims 8 and 32 were amended similarly for the same reason. Finally, the bodies of both claims 1 and 13 recite sensors providing signals or values representing physical parameters of a monitored system. This clearly ties the bodies of the claims to a particular apparatus, namely a monitoring apparatus. This is especially true since one of ordinary skill in the

art will understand that the thousands or millions of calculations performed for the invention to work is impossible for a person to do in a person's mind in any manner that would have a practical result.

Claim 32 is amended according to the Examiner's comment 6.1.2, to reflect a computer readable medium with executable instructions, along with a series of steps to be carried out by those instructions. This amendment emphasizes the tie between the claimed computer program product and the computing device that is the underlying apparatus and is supported explicitly in the specification (page 5, lines 9-11).

B. Practical Application of Abstract Idea

The independent claims also stand rejected for merely being directed to an abstract idea. With regard to claim 1, in addition to the explanation above that claim 1 is tied to a specific type of apparatus, Applicants traverse because claim 1 recites specific input in the form of signals, received automatically to a computer, and derived from a plurality of sensors where the signals represent physical parameters of a monitored system and where the signals are received as a set of training vectors. This is a very specific type, format, and nature of input, and by no means can it be characterized as generic. To make such a conclusion is to conclude that any data, no matter the format, is "generic".

Further, the claimed result is a practical application, and the adaptive model is not just a simple collection of data values. The claimed result is the training of the adaptive model with only vectors selected from the recited ranges (it will be understood by one of ordinary skill in the art that adaptive model is a more general term for the empirical model). As explained in the specification, once trained, the model is subsequently used by a monitoring module to provide indications about the operational states of the monitored system (page 10, line 26 – page 11, line 4). More

specifically, this model, based on a reduced set of training vectors, is then ready to be used by the monitoring module to receive current sensor readings to efficiently calculate estimated values and compare the estimated values to the current sensor readings to determine if a monitored machine or a sensor has a fault (*see* page 8, line 5 to page 11, line 4). Without an efficiently selected representative set of signals, the empirical model would be, at one extreme inefficient; or, at the other extreme unable to correctly indicate failure of the monitored system. (Page 3, line 27 – page 4, line 2). This result is a practical application of the abstract ideas embodied within the claim. Therefore, the training of the model, in and of itself, has real world value since it is claimed for a method of monitoring a system instrumented with sensors rather than simply an abstract idea divorced from a specific application. It should be noted that since the computer, sensors, and monitored system are recited in the body of the claim, these elements cannot be ignored by the Examiner as mere preamble.

Regarding claim 8, first, the Examiner's comment 6.1.4 that a machine implemented abstract idea is non-statutory, is respectfully traversed. The Supreme Court, in *Diamond v. Diehr*, held that an abstract idea may be claimed in a process, so long as that idea did not preclude all uses of the abstract idea. 450 U.S. 175, 188 (1981) (holding that the Arrhenius equation, an algorithm designed to determine rubber curing times, was patentable in the context of a machine for curing rubber). "Arrhenius' equation is not patentable in isolation, but when a process for curing rubber is devised which incorporates in it a more efficient solution of the equation, that process is at the very least not barred at the threshold by § 101." *Id.* Amended body of claim 8 recites an empirical modeling module for a system monitored with sensors. Thus, claim 8 does not preclude all uses of an algorithm for selecting a representative subset of data.

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Further, Applicants respectfully traverse for similar reasons as that explained above for claim 1. Thus, claim 8 recites a specific type, format, and nature of input data in the body of the claim (sensor data representative of operation states of the monitored system in the form of time-correlated observations representative of regularly spaced intervals). Claim 8 also recites the practical result of training the empirical model as with claim 1 and recites modules that perform tasks automatically. As explained above, the empirical model is not a simple collection of data, but rather a representative set of signals that correlate to a broad range of operational states of the monitored system. Thus, while the claim extends to many different types of monitored systems with sensors, it does not claim every application of an algorithm (*see, e.g.*, page 2, lines 3-11).

Regarding claim 13, Applicants repeat the arguments from above used to overcome the rejection of claims 1 and 8 since claim 13 has some similar features to those claims. Thus, the body of claim 13 recites specific input (historical data in the form of vectors of sensor values) and a practical application (forming the empirical from a training set) as explained above, as well as that tasks are performed automatically. Applicants also reassert that the empirical model is not a mere simple collection of data as explained above.

Regarding claim 26, Applicants repeat the arguments from above used to overcome the rejections of claims 1 and 8 since claim 26 has some similar features to those claims. Thus, the body of claim 26 recites specific input (snapshots of vectors of parameter values associated with the monitored system) and a practical application (establishment of a training set) as explained above. The training set is not merely an abstract idea unlimited to an application. As with the empirical model, the training set is a specific set of values formatted in a certain way for a very specific practical purpose:

so that the training set can be subsequently used to determine if the monitored machine or a sensor has a fault.

Regarding claim 32, Applicants repeat the arguments from above to overcome the rejection of claim 1, and specifically, that claim 32 also recites specific input (vectors of sensor values) and a result that is a practical application (training of the adaptive model). As explained above, the adaptive model is not an abstract idea divorced from any specific application.

For all of the reasons mentioned above, Applicants respectfully request that the 35 U.S.C. §101 rejections of claims 1, 8, 13, 26, and 32, and their dependent claims 2-7, 9-12, 14-21, 25, 27-28, 31, 33-37, and 50-54 has been overcome. Accordingly Applicants respectfully request that the §101 rejections be withdrawn.

III. CONCLUSION


In view of the foregoing, Applicants respectfully request reconsideration and allowance of all pending claims. The Examiner is invited to contact the undersigned attorney to expedite prosecution.

Respectfully submitted,

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